

CLAIMS

1. Process for the wet fractionation of oil seed press cake and/or meal,
characterized in
that oil seed press cake or meal is dispersed in water and subjected to a combined
5 treatment of wet milling, enzymes and heat, followed by a sequential fractionation
at an elevated temperature using centrifugal forces and size exclusion
(ultrafiltration) so as to yield one or more fibrous-rich fractions, at least three
different protein-rich fractions, optionally an oil-rich fraction, a sugar-rich fraction
and a phytate-rich fraction, followed by a final step consisting of drying or partial
10 evaporation of the above-said fractions.
2. Process according to claim 1,
wherein oil seed press cake or meal is the residual fibrous-protein fraction obtained
from conventional oil extraction processes of oil seeds of the type Soya, rapeseed,
15 cottonseed, sunflower, linseed and flax seed.
3. Process according to claims 1-2,
wherein the combination of wet milling, enzymatic and heat treatment is carried out
to achieve a high efficiency in the subsequent fractionation of the main components
20 of oilseed press-cake and meal, i.e. fibre, protein, oil, sugars and phytate, and that
an extraction rate of both protein, residual fat and phytate of at least 70% from the
original material is achieved.
4. Process according to claims 1-3,
25 wherein the enzymatic treatment is accomplished by using one or a combination of
more than one of the following enzymes: beta-glucanase, xylanase, hemicellulase,
arabinase and pectinase.
5. Process according to claim 1,
30 wherein an enzyme inactivation step is carried out prior to the fractionation step or
drying step.
6. Protein fraction obtained in accordance with the process of claims 1-5,
wherein the said fraction is provided in a dry form with at least 88% dry matter,
35 and it is comprised of one or more protein fractions produced in the said process,
and it contains 30 to 95% protein, and 1 to 60% oil.

7. Protein fraction obtained in accordance with the process of claims 1-4,
wherein the said fraction is provided in a dry form with at least 88% dry matter,
and it is comprised of one or more protein fractions produced in the said process,
5 and it contains 30 to 95% protein, 1 to 60% oil, and it contains active enzymes of
the type used in the process.
8. Oil fraction obtained in accordance with the process of claims 1-5,
wherein the said fraction is provided as an emulsified oil, and it is comprised of one
10 or two oil fractions produced in the said process, and it contains at least 60% fat,
and less than 30% protein.
9. Oil fraction obtained in accordance with the process of claims 1-4,
wherein the said fraction is provided as an emulsified oil, and it is comprised of one
15 or two oil fractions produced in the said process, and it contains at least 60% fat,
and less than 30% protein, and it contains active enzymes of the type used in the
process.
10. Fibre fraction obtained in accordance with the process of claims 1-5,
20 wherein the said fraction is provided in a dry form with at least 88% dry matter,
and it is comprised of at least 50% fibre, 15% protein and 10% fat.
11. Fibre fraction obtained in accordance with the process of claims 1-4,
wherein the said fraction is provided in a dry form with at least 88% dry matter,
25 and it is comprised of at least 50% fibre, 15% protein and 10% fat, and it contains
active enzymes of the type used in the process.
12. Sugar fraction obtained in accordance with the process of claims 1-5,
wherein the said fraction is provided in a syrup form with at least 75% dry matter,
30 and it consists of at least 50% neutral and acidic sugars.
13. Sugar fraction obtained in accordance with the process of claims 1-4,
wherein the said fraction is provided in a syrup form with at least 75% dry matter,
and it consists of at least 50% neutral and acidic sugars, and it contains active
35 enzymes of the type used in the process.

14. Phytate fraction obtained in accordance with the process of claims 1-5,
wherein the said fraction is provided in a dry form and contains 30 to 80% phytate.

5 15. Use of a protein fraction, as described in claim 6, in food or feed applications as a
protein ingredient or functional protein to replace other protein products from
vegetable, animal and microbial sources.

10 16. Use of a protein fraction, as described in claim 7, in feed applications as a protein
ingredient to replace other protein products from vegetable, animal and microbial
sources, with active enzymes used in the process for enhanced nutritive value.

15 17. Use of an oil fraction, as described in claim 8, in food or feed applications as a fat
substitute or emulsifier to replace other fat products from vegetable and animal
sources.

20 18. Use of an oil fraction, as described in claim 9, in feed applications as a fat substitute
or emulsifier to replace other fat products from vegetable and animal sources, with
active enzymes used in the process for enhanced nutritive value.

25 19. Use of a fibre fraction, as described in claim 10, in feed applications as a balanced
feed ingredient.

20 20. Use of a fibre fraction, as described in claim 11, in feed applications as a balanced
feed ingredient, with active enzymes used in the process for enhanced nutritive
value.

30 21. Use of a fibre fraction, as described in claim 11, as a biomass source used in
combustion for producing heat and/or other energy.

22. Use of a syrup fraction, as described in claim 12, in feed applications as an energy
source or a compound feed binder, or as a media for microbial fermentation.

35 23. Use of a syrup fraction, as described in claim 13, in feed applications as an energy
source or compound feed binder, with active enzymes used in the process for enhanced
nutritive value.

24. Use of a phytate fraction, as described in claim 14, in food and feed applications as an anti-oxidant and taste enrichment agent and in nutraceutical / cosmoceutical / pharmaceutical applications as a cancer-preventing, urinary calculi-preventing and bacterial tooth plaque-preventing agent.
25. Use of a phytate fraction, as described in claim 14, in nutraceutical / cosmoceutical / pharmaceutical applications as a cancer-preventing.
26. Use of a phytate fraction, as described in claim 14, in nutraceutical / cosmoceutical / pharmaceutical applications as a urinary calculi-preventing agent.
27. Use of a phytate fraction, as described in claim 14, in nutraceutical / cosmoceutical / pharmaceutical applications as a bacterial tooth plaque-preventing agent.
28. Use of a phytate fraction, as described in claim 14, as a paper coating agent.
29. Use of a phytate fraction, as described in claim 14, as a water treatment agent.
30. Use of a phytate fraction, as described in claim 14, as an ion exchange matrix.
31. Use of a phytate fraction, as described in claim 14, as an anti-oxidant coating on solid substrates.
32. Set up for carrying out the process according to claims 1-5, **characterized in** that it comprises a hydrolysis and heat treatment vessel (1), a wet mill (2), a heat exchanger (3) for enzymatic inactivation, mixing tanks (7, 9 and 12), decanters (4 and 8), separators (11 and 13), an ultra-filter (9), an evaporator (10), and dryers (5, 6 and 14).